

## HORIZONTALLY ADJUSTABLE CHAIR ARMREST

### BACKGROUND OF THE INVENTION

#### Cross Reference To Priority Applications

[0001] Not applicable.

#### Statement Regarding Federally Sponsored Research

[0002] Not applicable.

#### Field of the Invention

[0003] The present invention relates to a horizontally adjustable armrest for a chair, and more particularly to a horizontally adjustable armrest for an office chair, the armrest being capable of moving orthogonally and yet still being simply constructed and relatively inexpensive.

#### Description of the Related Art

[0004] Adjustable armrests now appear in many office chairs. Some adjust laterally, that is, away from or in toward a chair user. Others move longitudinally, forwardly and backwardly, relative to the chair and the user. Still others swivel in a horizontal plane or tilt about a horizontal axis. In other cases, chairs have armrests that put two or more of the above mentioned movements together.

[0005] Examples of horizontally adjustable armrests are shown in U.S. patents 6,592,085; 6,572,195; 6,213,556; 6,059,366; and 6,017,091.

## BRIEF SUMMARY OF THE INVENTION

[0006] What is described here is a horizontally adjustable armrest for a chair comprising a mounting member connected to the chair, the member having an upper base, first and second slide elements mounted to the base, the slide elements being movable in two directions generally perpendicular to each other, where each slide element has a slot and including fasteners positioned in the slots.

[0007] There are a number of advantages, features and objects achieved with the present invention which are believed not to be available in earlier related devices. For example, one advantage is that the present invention provides for a horizontally adjustable chair armrest which is movable in two horizontal directions, the directions being generally perpendicular to each other thereby providing a wide range of adjustability. Other objects of the present invention are that the horizontally adjustable armrest disclosed here is simply constructed and relatively inexpensive. Further advantages of the present invention are that the horizontally adjustable armrest is reliable and robust. Still other features of the horizontally adjustable armrest disclosed here are that the armrest is easily and quickly assembled and is easy to use.

[0008] A more complete understanding of the present invention and other objects, advantages and features thereof will be gained from a consideration of the following description of a preferred embodiment read in conjunction with the accompanying drawing provided herein. The preferred embodiment represents an example of the invention which is described here in compliance with Title 35 U.S.C. section 112 (first paragraph), but the invention itself is defined by the attached claims.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0009] FIGURE 1 is an isometric view of an office chair with horizontally adjustable armrests.

[0010] FIGURE 2 is an exploded isometric view of one of the horizontally adjustable armrests.

[0011] FIGURE 3 is another exploded isometric view of the horizontally adjustable armrest rotated about 90 degrees from the view shown in FIGURE 2.

[0012] FIGURE 4 is an exploded side elevation view of the armrest shown in FIGS. 2 and 3.

[0013] FIGURE 5 is a partial, sectional front elevation view of the armrest shown in FIGS. 2-4.

[0014] FIGURE 6 is an isometric view of a mounting member with an upper base telescopically extending from a support.

[0015] FIGURE 7 is a top plan view of the upper base.

[0016] FIGURE 8 is an isometric view of a first slide element of the armrest shown in FIGS. 2-7.

[0017] FIGURE 9 is a top plan view of the first slide element shown in FIG. 8.

[0018] FIGURE 10 is a bottom plan view of the first slide element.

[0019] FIGURE 11 is a sectional side elevation view of the first slide element mounted to the upper base.

[0020] FIGURE 12 is an isometric view of a second slide element.

[0021] FIGURE 13 is a top plan view of the second slide element.

[0022] FIGURE 14 is a side elevation view of the second slide element.

[0023] FIGURE 15 is a front elevation view of the second slide element.

[0024] FIGURE 16 is a bottom plan view of the second slide element.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

[0025] While the present invention is open to various modifications and alternative constructions, the preferred embodiment shown in the various figures of the drawing will be described herein in detail. It is understood, however, that there is no intention to limit the invention to the particular embodiment, form or example which is disclosed here. On the contrary, the intention is to cover all modifications, equivalent structures and methods, and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims, pursuant to Title 35 U.S.C. section 112 (second paragraph).

[0026] Referring now to FIGURE 1, there is shown an office chair 10 having adjustable armrests. The chair includes a base 12, a pedestal 14, a frame assembly 16, a seat assembly 18, a back assembly 20, a pair of adjustable armrests 22, 24 and control levers, such as a control lever 26.

[0027] The simplicity of the adjustable armrests may be appreciated by referring to FIGS. 2, 3, 4 and 5. The armrest 22 includes a support tube 30 connected to the frame assembly 16, a mounting member in the form of a vertical adjustment slide 32, a notched plate 34, an operating rod 36, a lock block 38 and a spring 40. The vertical adjustment slide acts as a mounting member and is formed with an upper base 42. Slidably mounted to the upper base 42 is a first or

lower slide element 44. Slidably mounted to the lower slide element 44 is a second or upper slide element 46 and attached to the upper slide element 46 is an armrest cover 48.

[0028] Reference is made to co-pending patent applications assigned to the same assignee as the present application and entitled *Vertically Adjustable Chair Armrest*, Application No.

\_\_\_\_\_, filed \_\_\_\_\_ (Docket No. 087522-785347); *Chair with Backward and Forward Passive Tilt Capabilities*, Application No. \_\_\_\_\_, filed \_\_\_\_\_, (Docket No. 087522-785323); *Chair Back*, Application No. \_\_\_\_\_, filed \_\_\_\_\_ (Docket No. 087522-785336); *Chair with Adjustable Seat Back*, Application No. \_\_\_\_\_, filed \_\_\_\_\_ (Docket No. 087533-785349); and *Tilt Lock Mechanism*, Application No. \_\_\_\_\_, filed \_\_\_\_\_ (Docket No. 087522-785350). These applications disclose other features of the chair. This disclosure here and the disclosure *Vertically Adjustable Chair Armrest* illustrate the full range of movement of the armrests, both vertically and horizontally. All applications just mentioned are incorporated herein by reference. It is to be appreciated that a chair armrest may be fixed vertically and only adjustable horizontally, or may be fixed horizontally and only adjustable vertically, or the horizontal adjustment assembly disclosed here may be used with a vertical adjustment assembly different from that disclosed in Application No. (087522-785347).

[0029] The upper base 42 has an arcuate upper surface 50, FIGS. 5, 6 and 7, and two fastener receiving openings 52, 54. Threaded inserts, not shown, may be molded into the base. Two elongated projections or guide rails 56, 58 are also formed in the upper surface 50, the elongated projections being disposed parallel to a first direction that extends forwardly and rearwardly or longitudinally as symbolized by a double headed arrow 60, FIG. 1.

[0030] Referring now to FIGS. 8, 9 and 10, the lower slide element 44 is an elongated molded element having rounded end portions 62, 64, an upper surface 70 and a lower surface 72. An elongated mounting slot 74 extending in the longitudinal direction has two end portions 76, 78. Bordering the slot opening is a slot lower wall 79, a shoulder 80 and a slot upper wall 82. The lower surface 72 is arcuate in shape for generally nesting onto the upper surface 50 of the base 42. The lower surface 72 of the lower slide element is generally textured but also includes two parallel smooth runways 84, 86 for moving over the projections 56, 58 of the upper base 42. The upper surface 70 includes two projections or guide rails 88, 90 directed in a second direction which is perpendicular to the first direction. The second direction is symbolized by a double headed arrow 91, FIG. 1. The lower slide element 44 also includes two fastener receiving openings 94, 96 to receive fasteners attaching the upper slide element 46. Two projecting spacers 97, 98 are formed in the upper surface 70, and these engage the upper slide element 46 and compensate for manufacturing tolerances to help provide a consistent sliding force on the upper slide element. The length of the slot 74 helps define the longitudinal adjustment travel of the lower slide element relative to the upper base 42.

[0031] A pair of fasteners 100, 102, FIGS. 2-4, 8, 9, 10 and 11, are provided, each having a head 104, 106 and a stem 108, 110. Assembled around the stems are springs 112, 114 and placed beneath the springs are a pair of washers 116, 118. The fasteners are located so that the stems 108, 110 extend through the slot 74 of the lower slide element 44 and are received by and engaged with the fastener receiving opening 52, 54 of the upper base 42. The washers slide along the shoulder 80 and support the springs between them and the heads of the fasteners. Each of the fastener stems includes a shoulder portion 119, 120, FIG 4, and a thread portion 121, 122.

The shoulder portions engage the lower slot wall 79 for guiding the sliding action of the power slide element 44.

[0032] The springs 112, 114 provide a biasing force against the washers 116, 118 which in turn bear against the shoulder 80, FIG. 11 of the slot. This arrangement ensures that the lower slide element 44 is pressed against the upper base 42 with a consistent force to compensate for manufacturing tolerances and provides the force to generate sufficient friction between the lower slide element 44 and the upper base 42 to restrain the location of the lower slide element once a chair user has adjusted the position of the lower slide element. Thus, flexibility is built into the manufacturing process of parts for the chair.

[0033] The upper slide element 46, FIGS. 12-16, is in the shape of a longitudinally arcuate panel with curved end portions 130, 132. The upper slide element includes two lateral slots 134, 136 (extending in the second direction) each having closed ends 138, 140 and 142, 144. The upper slide element includes shoulders 150, 151 around the slots, lower slot walls 152, 153 and upper slot walls 154, 156. In a lower surface 158 of the upper slide element, a pair of recesses 160, 162 are formed to receive and engage the guide rails 88, 90 of the lower slide element. Fastener openings 164, 166, 168, 170 are formed in the end portions and are used to receive fasteners to fasten the upper slide element to the armrest cover 48.

[0034] Another pair of fasteners 180, 182, FIGS. 2 and 12-16, are provided, each having a head 184, 186, FIG. 2, and a stem 188, 190. Assembled around the stems are springs 192, 194 and placed beneath the springs are a pair of washers 196, 198. The fasteners are placed so that the stems extend through the slots 134, 136 of the upper slide element 46 and are received by and engaged with the fastener receiving opening 94, 96 of the lower slide element 44. The washers

ride on the shoulders 150, 152 and support the springs between them and the heads of the fasteners. Each washer includes a peripheral rim 154, 156. The recesses 160, 162 guide sliding movement of the upper slide element 48 when the recesses engage the guide rails 88, 90 of the lower slide element 44.

[0035] The springs 192, 194 provide a biasing force against the washers which in turn bear against the shoulders 150, 152, and compensate for manufacturing tolerances. This arrangement also ensures that the upper slide element is pressed against the lower slide element with sufficient force to provide a needed friction force to restrain the location of the upper slide element once a chair user has adjusted the position of the upper slide element.

[0036] A set of four fasteners 200, 202, 204, 206, FIGS. 2 and 3, are provided to be received by the fastener openings 164, 166, 168, 170, FIG. 13, of the upper slide element and engage the cover 48.

[0037] The mounting member and upper base, the lower slide element and the upper slide member may be formed of a suitable synthetic resin, such as nylon.

[0038] The adjustable armrest is very easy to assemble and allows assembly to be quickly accomplished. The lower slide element 44 is connected to the upper base 42 of the vertical slide 32 using the two fasteners 100, 102. The lateral recesses 160, 162 of the upper slide element are aligned with the guide rails 88, 90 of the lower slide element and the fasteners 180, 182 fit through the slots 134, 136 and are received in the openings 94, 96. The upper slide element 46 is connected to the armrest cover 48 by using the fasteners 200, 202, 204, 206, FIGS. 2 and 3.

[0039] In operation, the lower slide element is able to slide longitudinally (first direction) relative to the upper base along the elongated slot 74. In a similar manner, the upper slide element slides laterally (second direction) relative to the lower slide element within the length of the lateral slots.

[0040] It can now be appreciated that within the parameters of this orthogonal movement, the armrests of the office chair may be adjusted longitudinally and laterally to any position within the limits of movement. Moreover, this is done with a simply constructed, relatively inexpensive structure which structure is reliable and robust.

[0041] The above specification describes in detail a preferred embodiment of the present invention. Other examples, embodiments, modifications and variations will, under both the literal claim language and the doctrine of equivalents, come within the scope of the invention defined by the appended claims. For example, altering the shapes of the lower slide element, the upper slide element, the upper base or the armrest cover will still be considered equivalent structures and will also come within the literal language of the claims. The same is true of the fasteners, the springs and the washers. Still other alternatives will also be equivalent as will many new technologies. There is no desire or intention here to limit in any way the application of the doctrine of equivalents nor to limit or restrict the scope of the invention.